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 (72) Inventor: JOHN EDWARD MAGGS

(19)



(54) IMPROVEMENTS IN OR RELATING TO CLOTHES WASHING  
MACHINES

(71) We, HOTPOINT LIMITED, of Peterborough, England, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to clothes washing machines of the kind comprising a container for the washing liquid, and within the container an agitator and a perforated spin drum rotatable about a common axis which is inclined at a substantial angle to the horizontal, usually vertical. In such machines the clothes are arranged to be subjected to a washing action in the presence of a washing liquid by rotating the agitator alternatively in opposite directions at a relatively low speed, and to a subsequent spinning action, following the emptying of the container, by rotating the perforated spin drum in one direction only at a suitably higher speed.

Hitherto the perforated drum has usually been supported by a hollow spindle which surrounds the drive shaft for the agitator, a gear box providing separate drives for the agitator drive shaft and the drum spindle through suitable clutch mechanisms.

An object of the invention is to provide a washing machine incorporating an alternative form of drive arrangement for the agitator and spin drum.

According to the invention in a washing machine of the kind referred to the agitator is connected to a drive shaft which is also arranged to provide the drive for the spin drum, the machine incorporating a coupling between the drive shaft and the drum which permits the shaft, and hence the agitator, to rotate to a limited extent in both directions at a relatively low speed to effect a washing action, without imparting any positive drive to the drum, but is capable of transmitting the rotation of the shaft to the drum when

the shaft is unidirectionally rotated at a higher speed, wherein the shaft carries a spiral spring having its outer end fixed with respect to the drum and its inner end loosely coiled around the shaft or a member rigidly carried thereby, such as to permit the shaft to rotate in both directions to the extent required for producing the washing action without a corresponding movement of the drum, but such that as the shaft rotates by more than a predetermined amount in the spin direction the spring tightens around the shaft or said member, as the case may be, such that the spring is rotated with the shaft and imparts its rotational movement to the drum.

Preferably the spring is such that when the drive shaft is arrested at the end of a spinning operation, the inertia of the drum causes the spring to unwind to an extent that it no longer grips the shaft, or said member rigidly carried thereby, and thereby permits the drum to run down independently of the shaft.

Any suitable drive means may be provided for reversibly rotating the agitator shaft at a relatively low speed, for effecting the washing action, and unidirectionally rotating it at a relatively high speed for producing the spin rotation of the drum.

The embodiment of the invention will now be described by way of example with reference to Figures 1 to 3 of the accompanying schematic drawings in which:

Figure 1 represents a part sectional elevation of a washing machine in accordance with the invention;

Figures 2 and 3 illustrate a sectional elevation and a sectional plan view of a drive arrangement for the washing machine.

Referring to Figure 1 of the drawings, the washing machine comprises an agitator 1, for providing a reversible rotary wash action, mounted within a perforated spin drum 2 which is housed, in turn, within an

outer water container 3. The agitator 1 is driven by a single shaft 4 vertically mounted in a support tube 5 which is attached to a supporting bracket 6, the shaft carrying at its lower end a pulley 7 which is coupled by a driving belt 8 to an output pulley 9 of a reversible drive unit 10, capable of providing a low speed reversible drive for the wash action of the agitator and also a high speed unidirectional drive for the drum 2.

The agitator 1 and spin drum 2, together with the drive unit 10 and a counter balance weight 11 are mounted on a chassis 12 which is flexibly suspended by a frame 13 which also supports the water container 3.

In providing the wash action the agitator 1 if arranged to reversibly rotate through an arc of about  $\frac{3}{4}$  of a turn, the output pulley 9 being arranged to be driven by the drive means alternately in opposite directions by an appropriate amount to obtain the required degree of movement of the agitator.

The high speed unidirectional drive for the spin drum 2 is also derived from the drive unit which is arranged to rotate the agitator drive shaft 4 at a suitably high speed in one direction, also by means of the belt and pulley system (7.8.9).

In order to enable this to be achieved there is provided a coupling between the agitator drive shaft 4 and the spin drum 2 as shown in Figures 2 and 3. At its upper end the shaft 4 carries a spider 14 on which is mounted the agitator 1, together with a driving bush 21 carrying a spiral spring 20 which has its outer end attached to a pin 19 and has the coils at its inner end loosely wrapped about a bush 21 attached to the agitator shaft 4. A spigot 17 rotationally supported on the shaft by bearings 18 carries the spin drum 2. A pin 19 fixed to the spigot 17 is attached to the spring 20.

In operation in the wash mode, the bush 21 reversibly rotates with respect to the pin 19, the spring 20 allowing this degree of movement without driving the spin drum 2, while the spin mode the direction of rotation of the agitator shaft 4 is arranged to be such as to cause the coils of the spring 20 to be tightened around the bush 21. This then carries the spring with it and by means of the pin 19 causes the spigot 17, and thus the drum 2, to be rotated at the same speed. When the drive motor is de-energised the drive tends to over-run the slowing motor speed, but this causes the spring 20 to unwind leaving both the drum 2 and the motor to run down independently.

#### WHAT WE CLAIM IS:-

1. A washing machine of the kind referred to wherein the agitator is connected to a drive shaft which is also arranged to provide the drive for the spin drum, the machine incorporating a coupling between the drive shaft and the drum which permits the shaft,

and hence the agitator, to rotate to a limited extent in both directions at a relatively low speed to effect a washing action, without imparting any positive drive to the drum, but is capable of transmitting the rotation of the shaft to the drum when the shaft is unidirectionally rotated at a higher speed, wherein the shaft carries a spiral spring having its outer end fixed with respect to the drum and its inner end loosely coiled around the shaft, or a member rigidly carried thereby, such as to permit the shaft to rotate in both directions to the extent required for producing the washing action without a corresponding movement of the drum, but such that as the shaft rotates by more than a predetermined amount in the spin direction the spring tightens around the shaft or said member, as the case may be, such that the spring is rotated with the shaft and imparts its rotational movement to the drum.

2. A washing machine according to Claim 1 wherein the spring is such that, when the drive shaft is arrested at the end of a spinning operation, the inertia of the drum causes the spring to unwind to an extent that it no longer grips the shaft, or said member rigidly carried thereby, and thereby permits the drum to run down independently of the shaft.

3. A washing machine of the kind referred to substantially as shown in and as hereinbefore described with reference to Figures 1, 2 and 3 of the accompanying drawings.

For the Applicants,  
H.V. KIRBY,  
Chartered Patent Agent.

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COMPLETE SPECIFICATION

2 SHEETS

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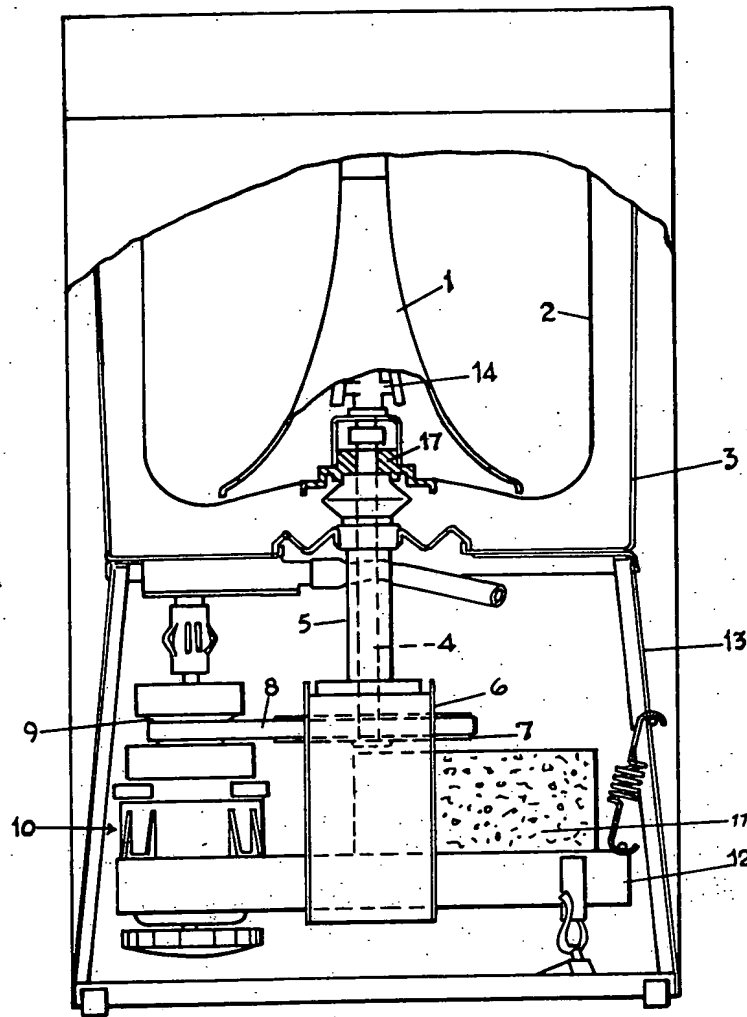


FIG. 1.

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Sheet 2

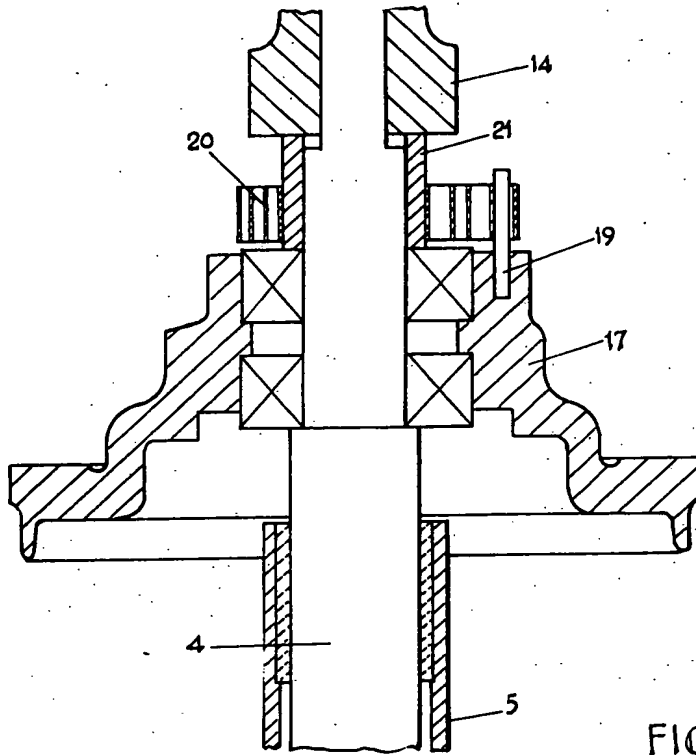


FIG. 2.

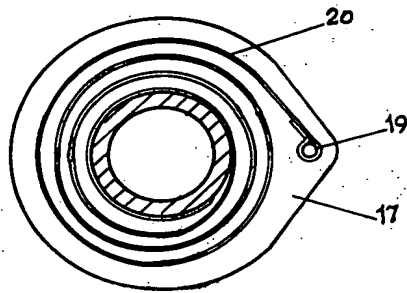


FIG. 3.

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